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# ARM Facilities Newsletter

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## Raman Lidar Receives Improvements

The Raman lidar at the SGP central facility is receiving upgrades to its environmental controls. This ground-based remote sensing instrument uses a laser to measure vertical profiles of water vapor mixing ratio, as well as many cloud and aerosol quantities. The lidar is housed in a shipping container (Figure 1) that has its own heating and air conditioning unit to maintain the stable temperature and humidity levels required by the computer and laser equipment.

Although great care was taken to engineer the appropriate climate controls, problems have occurred over the years. Laser optics are heat sensitive, and the quality of the emitted beam varies if the temperature is not stable. The present air conditioning setup has allowed the optics to cool down when the unit is on and warm up when the unit is off. These thermal changes during air

conditioner cycling disrupt the laser beam output and the instantaneous alignment of the light collection optics.



Figure 1. The Raman lidar shelter at the SGP central facility.

Furthermore, during late summer the outside air temperature gets so warm that the air conditioning unit cannot keep pace. At times, the temperatures inside the shelter have become too hot for the laser components, causing them to fail. Component failure is an extra expense, and it results in loss of data until repairs can be made.

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To eliminate these problems, a ventilation and air conditioning upgrade is being completed. All new ductwork and two air-handling units are being installed and weatherproofed (Figure 2). The more efficient system will moderate the temperature swings during the unit's on-off cycles and will handle the late summer heat better. These improvements will protect the lidar equipment so that it can provide valid, useable data streams.

Dust in the shelter, due in part to windy conditions, has been another problem. To minimize dirt and dust that interfere with operation and can damage the lidar components, special HEPA air filters are being installed. A new entrance shelter is also being added to reduce the amount of dirt that enters through the doorway.

Late this fall, a second laser head will be installed. In the past, component failures in the existing laser head have resulted in days and sometimes weeks of down time for repair. The second head will provide redundancy; if one head needs repair, the second will be available to continue instrument operation.



Figure 2. The new air conditioning unit and ductwork for the Raman lidar shelter.

## Okmulgee Tower Upgrades

The instrument tower at Okmulgee State Park has been plagued with problems caused by turkey vultures using it as their perch. Vultures roosting on the

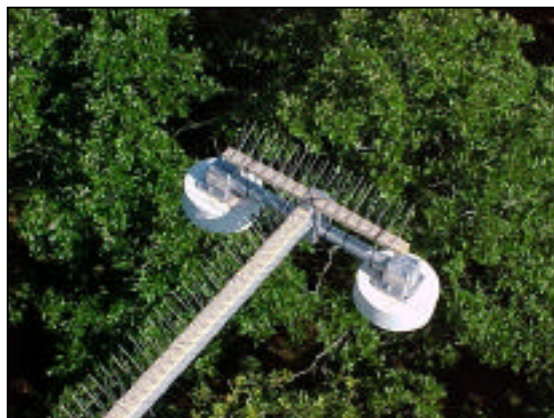


Figure 3. Bird spikes mounted to an instrument boom on the Okmulgee tower.

booms extending from the tower coat the instruments and the stairways below with droppings. Methods used in the past to make the tower less inviting include a sonic bird repeller that emits a turkey vulture distress cry, an inflatable red and yellow ball intended to frightening the birds, and a rotating wire fixed to the top of the tower. These devices were not very successful. The latest attempt at sending a "no roosting here" message to the vultures is the installation of bird spikes (Figure 3), upward-pointing metal pickets designed to eliminate open spaces for roosting. So far, this impediment has been successful.

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